1-, 2-, and 4-Port T1/E1 HWICs and 8-Port T1/E1 Network Module

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This document describes the following Cisco products:

- Cisco 1-Port and 2-Port Channelized T1/E1 and ISDN PRI High Speed WAN Interface Cards (HWICs)
  - 1-port part number: HWIC-1CE1T1-PRI
  - 2-port part number: HWIC-2CE1T1-PRI
  - Provides channelized T1 or E1 connections or ISDN PRI connections
  - Supported on Cisco 2821, and 2851 routers, and on Cisco 3800 series routers
- Cisco 4-Port T1/E1 HWIC
  - Part number: HWIC-4T1/E1
  - Provides clear channel T1 or E1 connections
  - Supported on 2821, and 2851 routers, and on Cisco 3800 series routers
- Cisco 8-Port Channelized T1/E1 and ISDN PRI High Speed WAN Network Module
  - Part number: NM-8CE1T1-PRI
  - Provides channelized T1 or E1 connections or ISDN PRI connections
  - Supported on Cisco 3800 series routers

Finding Feature Information in This Module

Your Cisco IOS software release may not support all of the features documented in this module. To reach links to specific feature documentation in this module and to see a list of the releases in which each feature is supported, use the "Feature Information for T1/E1 HWICs and Network Modules" section on page 21.

Finding Support Information for Platforms and Cisco IOS and Catalyst OS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS and Catalyst OS software image support. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

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Restrictions for T1/E1 HWICs and Network Module

- The Cisco 2811 does not support the HWIC-4T1/E1 module.
- Voice features are not supported on the HWICs or the network module.
- Wetting current is not supported on the HWICs or the network module.
- V54 loop up/down code recognition is not supported on the HWICs or the network module.
- The 1-port and 2-port HWICs support up to 32 channels per port (up to 64 channels total on the 2-port HWIC).
- The 4-port clear channel HWIC supports 1 channel per port, or 4 channels total for the HWIC.
- The 8-port network module is supported only on Cisco 3800 series routers (the Cisco 3825 and Cisco 3845 routers).
- The 8-port network module supports a maximum of 128 channels.
- Bit Error Rate Tester (BERT) runs on the entire controller and not on specific channel groups. Because of this, only a limited number of patterns are supported. See the "Configuring the T1/E1 HWICs or Network Module" section on page 6 for more details.

Information About T1/E1 HWICs and Network Module

To configure the T1/E1 HWICs and network module, you should understand the following:

Interface Numbering on Cisco 2800 and Cisco 3800 Series Routers

Table 1 summarizes the interface numbering on Cisco 2811, 2821, and 2851 routers and on Cisco 3800 series routers. Table 2 gives the port numbering for the T1/E1 HWICs and network module.

Table 1 Interface Numbering on Cisco 2800 and Cisco 3800 Series Routers

Router	HWIC Interfaces	Network Module Interfaces
2811, 2821, and 2851	0/HWIC slot/port[1]	No support for the 8-port T1/E1 network module.
3825	0/HWIC slot/port[1]	Network module slot/port[2]
3845	0/HWIC slot/port[1]	Network module slot/port[3]

1. Interface numbering for HWIC interfaces on all routers begins with 0. Then, each router has four HWIC slots that are numbered from 0 to 3.
2. The 3825 router has two network module slots, numbered 1 to 2.
3. The 3845 router has four network module slots, numbered 1 to 4.

For illustrations of HWIC slots in the Cisco 2811, 2821, and 2851 routers, see Overview of Cisco 2800 Series Routers.

For illustrations of HWIC and network module slots in the Cisco 3825 and 3845 routers, see Overview of Cisco 3800 Series Routers.

Table 2 Port Numbering on T1/E1 HWICs and Network Module

Interface	Port Numbering
1-port T1/E1 HWIC	0
2-port T1/E1 HWIC	0 to 1
4-port T1/E1 HWIC	0 to 3
8-port T1/E1 network module	0 to 7

Some examples are as follows:

- Port 0 of an HWIC in HWIC slot 0: 0/0/0
- Port 1 of a 2- or 4-port HWIC in HWIC slot 1: 0/1/1
- Port 3 of the 4-port HWIC in HWIC slot 2: 0/2/3
- Port 6 of the 8-port network module in network module slot 2: 2/6

How to Configure T1/E1 HWICs and Network Module

Configuring Card Type

To configure the T1/E1 HWICs and network module for T1 or E1 operation, perform the following tasks.

Note The T1/E1 HWICs or network module will not be operational until a card type is configured.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **card type** {**t1** | **e1**} *slot subslot*

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**card type** {**t1** | **e1**} *slot subslot* **Example:** `Router(config)# card type t1 0 2`	Specifies T1 or E1 connectivity. *slot* refers to the network module slot on the 2800 series and 3800 series platform. *subslot* refers to the HWIC slot on the platform. See the "Interface Numbering on Cisco 2800 and Cisco 3800 Series Routers" section on page 3.

Changing Card Type

To change a card type from T1 to E1, or from E1 to T1, perform the following tasks:

SUMMARY STEPS

1. **enable**
2. **configure terminal**

3. **no card type {t1 | e1}** *slot subslot*
4. **card type** {**t1** | **e1**} *slot subslot*
5. **write**
6. **reload**
7. **boot**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**no card type** {**t1** | **e1**} *slot subslot* **Example:** `Router(config)# no card type t1 0 2`	Optional. Removes the previously configured card type for the HWIC or network module.
Step 4	**card type** {**t1** | **e1**} *slot subslot* **Example:** `Router(config)# card type e1 0 2`	Specifies T1 or E1 connectivity for the HWIC or network module.
Step 5	**write** **Example:** `Router(config)# write`	Rebuilds the router configuration.
Step 6	**reload** **Example:** `Router(config)# reload`	Reloads router so that changes can take affect. After this command executes, the router will go to ROM monitor (rommon) mode.
Step 7	**boot** **Example:** `Router(rommon)# boot`	Boots the router for the configuration with the newly selected card type.

Configuring the T1/E1 HWICs or Network Module

To configure the T1/E1 HWICs or network module, perform the following tasks:

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **network-clock-participate** [**slot** *slot-number* | **wic** *wic-slot*]
4. **controller** {**t1** | **e1**} *slot/subslot/port*
5. **framing** {**sf** | **esf**}

   or

   framing {**crc4** | **no-crc4**}
6. **linecode** {**ami** | **b8zs**}

   or

   linecode {**ami** | **hdb3**}
7. **fdl** {**att** | **ansi** | **both**}
8. **clock source** {**line** | **internal**}
9. **line-termination** {**75-ohm** | **120-ohm**}
10. **loopback** {**diagnostic** | **local** {**payload** | **line**} | **remote** {**iboc** | **esf** {**payload** | **line**}}}
11. **cablelength long** *db-loss-value*

    or

    cablelength short *length*
12. **channel group** *channel-group-number* {**timeslots** *range* [**speed** *kbps*] | **unframed**}

    or

    pri-group timeslots *timeslot-range* [**nfas_d** | **service**]

    or

    tdm-group *tdm-group-no* **timeslots** *timeslot-range*
13. **national reserve** *N sa4 sa5 sa6 sa7 sa8*
14. **crc-threshold** *value*
15. **yellow** {**generation** | **detection**}
16. **bert pattern** *pattern* **interval** *time*

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**network-clock-participate** [**slot** *slot-number* | **wic** *wic-slot*] **Example:** `Router(config)# network-clock-participate wic 0`	TDM group configuration only. Allows the ports on a specified network module or interface card to use the network clock for timing.
Step 4	**controller** {**t1** | **e1**} *slot/subslot/port* **Example:** `Router(config)# controller t1 1/0`	Enters controller configuration mode. For interface numbering conventions on the Cisco 2800 and 3800 series routers, see the "Interface Numbering on Cisco 2800 and Cisco 3800 Series Routers" section on page 3.
Step 5	**framing** {**sf** | **esf**} or **framing** {**crc4** | **no-crc4**} **Example:** `Router(config-controller)# framing esf`	In T1 configurations, specifies super frame (**sf**) or extended super frame (**esf**) as the frame type for data lines. Default is **esf**. In E1 configurations, specifies cyclic. redundancy check 4 (**crc4**) or **no-crc4** as the frame type for data lines. Default is **crc4**.
Step 6	**linecode** {**ami** | **b8zs**} or **linecode** {**ami** | **hdb3**} **Example:** `Router(config-controller)# linecode b8zs`	In T1 configurations, specifies alternate mark inversion (AMI) or b8zs as the linecode. Default is **b8zs**. In E1 configurations, specifies AMI or high-density bipolar 3 (hdb3) as the linecode. Default is **hdb3**. **Note** When using linecode AMI, the user is advised to select 56 kbps as the speed or make sure that the channel groups created do not contain all the timeslots. See Step 12. This is to avoid exceeding the "15 zeroes" threshhold specified by standards.
Step 7	**fdl** {**att** | **ansi** | **both**} **Example:** `Router(config-controller)# fdl both`	T1 only. Sets the facility data link (fdl) exchange standard for T1 interfaces using esf framing. Can select the ATT standard (ATT TR54016), the ANSI standard (ANSI T1.403), or both standards. Default is **ansi**. To disable fdl, enter the command **no fdl**.

	Command or Action	Purpose
Step 8	**clock source** {**line** [**independent**] | **internal**} **Example:** `Router(config-controller)# clock source line`	**line** specifies that the clocking on this controller is derived from an external source, generally the telephone central office. **line independent** configures the port to be independent in the TDM docmain, which is when **network-clock-participate** is configured on the card. **internal** specifies that the clock is generated by internal controller circuitry. Default is **line**.

Step 9	**line-termination** {**75-ohm** | **120-ohm**}
	
	Example:
	`Router(config-controller)# line-termination 75-ohm`
		E1 only. Sets the line termination on an E1 controller.
		
		• **75-ohm** specifies the 75 ohm unbalanced termination.
		• **120-ohm** specifies the 120 ohm balanced termination.
		
		Default is **120-ohm**.
		
		Note On the 4-port HWIC and 8-port network module, line impedance will be set to the same value for each port in a two-port slice automatically. That is, on the 4-port HWIC, ports 0 and 1 will be set to the same value, and ports 2 and 3 will be set to the same value. On the 8-port network module, ports 0 and 1 will be set to the same value, as will ports 2 and 3, ports 4 and 5, and ports 6 and 7. In these cases, a message will be displayed. The example here shows the message displayed when the line termination on port 0 is changed:
		`Router(config)# controller e1 0/1/0`
		`Router(config-controller)#line-termination 75-ohm`
		`Changing the line termination for ports 0 and 1 to 75`

Step 10	**loopback** {**diagnostic** | **local** {**payload** | **line**} | **remote** {**iboc** | **esf** {**payload** | **line**}}} **Example:** `Router(config-controller)# loopback remote esf line`	Sets the loopback method for testing the interface. Options are: • **diagnostic** loops transmit signal back to receive • **local** puts the interface into local loopback mode at the **payload** or **line** level • **remote** puts the interface into remote loopback mode through an inband bit oriented code (iboc) or, for T1 only, **remote esf**, which uses fdl codes to set **payload** or **line** levels.

	Command or Action	Purpose
Step 11	**cablelength long** *db-loss-value*	T1 only. **cablelength long** attenuates the pulse from the transmitter using pulse equalization and line build-out. This command applies to cables longer than 660 feet. Loss values are: • *0db* • *-7.5db* • *-15db* • *-22.5db* Default attenuation is *0db*.
	or **cablelength short** *length* **Example:** `Router(config-controller)# cablelength short 133`	**cablelength short** sets transmission attenuation for cable lengths of 660 feet or less. Cable lengths can be specified as follows: • *110* for cable lengths from 0 to 110 feet • *220* for cable lengths from 110 to 220 feet • *330* for cable lengths from 220 to 330 feet • *440* for cable lengths from 330 to 440 feet • *550* for cable lengths from 440 to 550 feet • *660* for cable lengths from 550 to 660 feet There is no default cable length.

	Command or Action	Purpose
Step 12	**channel group** *channel-group-number* {**timeslots** *range* [**speed** *kbps*] | **unframed**}	**Note** This step does not apply to the clear channel 4-port T1/E1 HWIC. Configures the serial WAN on a T1 or E1 interface by specifying channels and their timeslots. For T1, values are as follows: • *channel-group-number* is from 0 to 23 • **timeslots** *range* is from 1 to 24 • Default value of **speed** in T1 is 64 kbps. Configuration of **speed** is optional. For E1, values are as follows: • *channel-group-number* is from 0 to 30 • **timeslots** *range* is from 1 to 31 • Default value of **speed** in E1 is 64 kbps. Configuration of **speed** is optional. • **unframed** (E1 only) specifies that all 32 timeslots are to be used for data, and that none are to be used for framing signals.
	or **pri-group timeslots** *timeslot-range*	or Configures specified timeslots on T1 or E1 interfaces for PRI for transporting ISDN data.
	or **tdm-group** *tdm-group-no* **timeslots** *timeslot-range*	or Configures specified timeslots on T1 or E1 interfaces to create clear chanel groups for time division multiplexing. For the tdm-group configuration to work, it is necessary to configure **network-clock-participate** for the interface in global configuration mode.
	Example: `Router(config-controller)# channel group 1 timeslots 1-4`	
Step 13	**national reserve** *N sa4 sa5 sa6 sa7 sa8* **Example:** `Router(config-controller)# national reserve 0 1 1 1 1 0`	E1 only. Sets the 6 required national bits in E1 in the G.751 frame. Default is 1 1 1 1 1 1.
Step 14	**crc-threshold** *value* **Example:** `Router(config-controller)# crc-threshold 500`	T1 only. Defines a severely errored second by specifying the number of crc errors that must occur in one second to reach the severely errored state. Default is 320.

	Command or Action	Purpose
Step 15	**yellow** {**generation** | **detection**} **Example:** `Router(config-controller)# no yellow detection`	Enables generation and detection of yellow alarms. Default condition is that **generation** and **detection** of yellow alarms are enabled. Use the **no** form of the command to disable yellow alarm detection.
Step 16	**bert pattern** *pattern* **interval** *time* **Example:** `Router(config-controller)# bert 2^11 interval 1440`	Optional. Activates the Bit Error Rate Tester (bert) with the chosen test pattern for a specified duration. Configure bert patterns on T1/E1 HWICs or network module as follows: • When the linecode is AMI, use patterns 2^11, 2^15, or 2^20-QRSS. • When the linecode is b8zs or hdb3, use patterns 2^11, 2^15, 2^20-QRSS, or 2^20-O.153. **Note** If any other bert pattern is chosen, an error message will appear that lists the supported patterns for the configured linecode. A complete listing of bert patterns is in the *Cisco IOS Master Commands List, Release 12.4*. **interval** *time* is from 1 to 14,400 minutes.

Configuration Examples for T1/E1 HWICs and Network Module

This section shows configuration examples for the 4-port HWIC in both T1 and E1 configurations.

- 4-Port T1 HWIC: Example, page 11
- 4-Port E1 HWIC: Example, page 14

4-Port T1 HWIC: Example

In this example, the 4-port HWIC is set to card type T1, and is configured with default settings. Channel groups are defined on ports 0, 1, and 2.

```
router#show running-config
Building configuration...

Current configuration : 1454 bytes
!
! Last configuration change at 09:49:03 UTC Tue Sep 19 2006
!
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
service internal
!
hostname router
!
boot-start-marker
boot-end-marker
```

```
!
card type t1 0 2
!
no aaa new-model
!
resource policy
!
no network-clock-participate wic 2
!
ip cef
!
!
!
voice-card 0
 no dspfarm
!
!
!
controller T1 0/2/0
 framing esf
 linecode b8zs
 cablelength long 0db
 channel-group 1 timeslots 5
!
controller T1 0/2/1
 framing esf
 linecode b8zs
 cablelength long 0db
 channel-group 2 timeslots 10
!
controller T1 0/2/2
 framing esf
 linecode b8zs
 cablelength long 0db
 channel-group 3 timeslots 15
!
controller T1 0/2/3
 framing esf
 linecode b8zs
 cablelength long 0db
!
!
!
interface GigabitEthernet0/0
 ip address 1.7.7.12 255.255.0.0
 duplex auto
 speed auto
 media-type rj45
!
interface GigabitEthernet0/1
 ip address 20.20.20.1 255.255.255.0
 duplex auto
 speed auto
 media-type rj45
!
interface Serial0/2/0:1
 no ip address
!
interface Serial0/2/1:2
 no ip address
!
interface Serial0/2/2:3
 no ip address
!
```

```
ip default-gateway 1.7.0.1
ip route 223.255.254.0 255.255.255.0 GigabitEthernet0/0
!
!
ip http server
no ip http secure-server
!
!
!
control-plane
!
!
!
line con 0
 exec-timeout 0 0
 stopbits 1
line aux 0
 stopbits 1
line vty 0 4
 login
!
scheduler allocate 20000 1000
!
end

router#
```

The command **show controllers t1** gives the following output.

```
router# show controllers t1
T1 0/2/0 is up.
  Applique type is Channelized T1
  Cablelength is long gain36 0db
  No alarms detected.
  alarm-trigger is not set
  Soaking time: 3, Clearance time: 10
  AIS State:Clear  LOS State:Clear  LOF State:Clear
  Version info FPGA Rev: 06080409, FPGA Type: PRK4
  Framing is ESF, Line Code is B8ZS, Clock Source is Line.
  CRC Threshold is 320. Reported from firmware  is 320.
  Data in current interval (889 seconds elapsed):
     0 Line Code Violations, 0 Path Code Violations
     0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
     0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
  Total Data (last 24 hours)
     1 Line Code Violations, 2 Path Code Violations,
     0 Slip Secs, 1 Fr Loss Secs, 1 Line Err Secs, 0 Degraded Mins,
     1 Errored Secs, 0 Bursty Err Secs, 1 Severely Err Secs, 0 Unavail Secs
T1 0/2/1 is up.
  Applique type is Channelized T1
  Cablelength is long gain36 0db
  No alarms detected.
  alarm-trigger is not set
  Soaking time: 3, Clearance time: 10
  AIS State:Clear  LOS State:Clear  LOF State:Clear
  Version info FPGA Rev: 06080409, FPGA Type: PRK4
  Framing is ESF, Line Code is B8ZS, Clock Source is Line.
  CRC Threshold is 320. Reported from firmware  is 320.
  Data in current interval (892 seconds elapsed):
     0 Line Code Violations, 0 Path Code Violations
     0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
     0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
  Total Data (last 24 hours)
     0 Line Code Violations, 0 Path Code Violations,
```

```
     0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
     0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
T1 0/2/2 is up.
  Applique type is Channelized T1
  Cablelength is long gain36 0db
  No alarms detected.
  alarm-trigger is not set
  Soaking time: 3, Clearance time: 10
  AIS State:Clear  LOS State:Clear  LOF State:Clear
  Version info FPGA Rev: 06080409, FPGA Type: PRK4
  Framing is ESF, Line Code is B8ZS, Clock Source is Line.
  CRC Threshold is 320. Reported from firmware  is 320.
  Data in current interval (893 seconds elapsed):
     0 Line Code Violations, 0 Path Code Violations
     0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
     0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
  Total Data (last 24 hours)
     0 Line Code Violations, 0 Path Code Violations,
     0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
     0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
T1 0/2/3 is up.
  Applique type is Channelized T1
  Cablelength is long gain36 0db
  No alarms detected.
  alarm-trigger is not set
  Soaking time: 3, Clearance time: 10
  AIS State:Clear  LOS State:Clear  LOF State:Clear
  Version info FPGA Rev: 06080409, FPGA Type: PRK4
  Framing is ESF, Line Code is B8ZS, Clock Source is Line.
  CRC Threshold is 320. Reported from firmware  is 320.
  Data in current interval (896 seconds elapsed):
     0 Line Code Violations, 0 Path Code Violations
     0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
     0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
  Total Data (last 24 hours)
     0 Line Code Violations, 0 Path Code Violations,
     0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
     0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
router#
```

4-Port E1 HWIC: Example

In this example, the 4-port HWIC is set to card type E1, and is configured with default settings. A channel group is defined on port 0. The command **show running-config** gives the following output.

```
router# show running-config
Building configuration...

Current configuration : 1192 bytes
!
! Last configuration change at 01:18:52 UTC Wed Sep 20 2006
!
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
service internal
!
hostname router
!
boot-start-marker
boot-end-marker
```

```
!
card type e1 0 2
!
no aaa new-model
!
resource policy
!
no network-clock-participate wic 2
!
ip cef
!
!
!
voice-card 0
 no dspfarm
!
!
!
controller E1 0/2/0
channel-group 1 timeslots 5
national reserve 0 1 1 1 1 0
!
controller E1 0/2/1
!
controller E1 0/2/2
!
controller E1 0/2/3
!
!
!
interface GigabitEthernet0/0
 ip address 1.7.7.12 255.255.0.0
 duplex auto
 speed auto
 media-type rj45
!
interface GigabitEthernet0/1
 ip address 20.20.20.1 255.255.255.0
 duplex auto
 speed auto
 media-type rj45
!
interface Serial0/2/0:1
 no ip address
!
ip default-gateway 1.7.0.1
ip route 223.255.254.0 255.255.255.0 GigabitEthernet0/0
!
!
ip http server
no ip http secure-server
!
!
!
control-plane
!
!
!
line con 0
 exec-timeout 0 0
 stopbits 1
line aux 0
 stopbits 1
line vty 0 4
```

```
 login
!
scheduler allocate 20000 1000
!
end
router#
```

The command **show controllers e1** gives the following output.

```
router#show controllers e1
E1 0/2/0 is up.
  Applique type is Channelized E1 - balanced
  No alarms detected.
  alarm-trigger is not set
  Version info FPGA Rev: 06080409, FPGA Type: PRK4
  Framing is CRC4, Line Code is HDB3, Clock Source is Line.
  CRC Threshold is 320. Reported from firmware  is 320.
  International Bit: 0, National Bits: 11110
  Data in current interval (621 seconds elapsed):
     5 Line Code Violations, 0 Path Code Violations
     0 Slip Secs, 0 Fr Loss Secs, 2 Line Err Secs, 0 Degraded Mins
     0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
E1 0/2/1 is up.
  Applique type is Channelized E1 - balanced
  No alarms detected.
  alarm-trigger is not set
  Version info FPGA Rev: 06080409, FPGA Type: PRK4
  Framing is CRC4, Line Code is HDB3, Clock Source is Line.
  CRC Threshold is 320. Reported from firmware  is 320.
  Data in current interval (630 seconds elapsed):
     5 Line Code Violations, 0 Path Code Violations
     0 Slip Secs, 0 Fr Loss Secs, 1 Line Err Secs, 0 Degraded Mins
     0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
E1 0/2/2 is up.
  Applique type is Channelized E1 - balanced
  No alarms detected.
  alarm-trigger is not set
  Version info FPGA Rev: 06080409, FPGA Type: PRK4
  Framing is CRC4, Line Code is HDB3, Clock Source is Line.
  CRC Threshold is 320. Reported from firmware  is 320.
  Data in current interval (648 seconds elapsed):
     4 Line Code Violations, 0 Path Code Violations
     0 Slip Secs, 0 Fr Loss Secs, 1 Line Err Secs, 0 Degraded Mins
     0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
E1 0/2/3 is up.
  Applique type is Channelized E1 - balanced
  No alarms detected.
  alarm-trigger is not set
  Version info FPGA Rev: 06080409, FPGA Type: PRK4
  Framing is CRC4, Line Code is HDB3, Clock Source is Line.
  CRC Threshold is 320. Reported from firmware  is 320.
  Data in current interval (660 seconds elapsed):
     56 Line Code Violations, 0 Path Code Violations
     0 Slip Secs, 0 Fr Loss Secs, 1 Line Err Secs, 0 Degraded Mins
     0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
router
```

Additional References

The following sections provide references related to the T1/E1 HWICs and Network Module feature.

Related Documents

Related Topic	Document Title
Hardware installation of network modules	*Cisco Network Modules Hardware Installation Guide*
CLI Commands Reference	*Cisco IOS Master Commands List, Release 12.4*

Standards

Standard	Title
No new or modified standards are supported by this feature, and support for existing standards have not been modified by this feature.	—

MIBs

MIB	MIBs Link
No new or modified MIBs are supported by this feature, and support for existing MIBs have not been modified by this feature.	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFC	Title
No new or modified RFCs are supported by this feature, and support for existing RFCs have not been modified by this feature.	—

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/techsupport

Command Reference

This section documents only commands that are modified.

- controller

controller

To configure a T1, E1, or J1 controller and enter controller configuration mode, use the **controller** command in global configuration mode.

Cisco 2600 and 3600 Series Routers

controller {**t1** | **e1** | **j1**} *slot*/*port*

Cisco 7200 Series and Cisco 7500 Series Routers

controller {**t1** | **e1**} *slot*/*port*

Cisco AS5300 Access Servers

controller {**t1** | **e1**} *number*

Cisco AS5800 Access Servers

controller t1 *dial-shelf*/*slot*/*t3-port*:*t1-num*

Cisco 2800 and 3800 Series Routers

controller {**t1** | **e1**} *slot*/*subslot*/*port*

Syntax Description

t1	T1 controller.
e1	E1 controller.
j1	J1 controller.
slot/*port*	Backplane slot number and port number on the interface. Refer to your hardware installation manual for the specific values and slot numbers.
slot/*subslot*/*port*	Backplane slot number, subslot number, and port number on the interface. Refer to your hardware installation guide for the specific values, and slot and subslot numbers.
number	Network processor module (NPM) number, in the range 0 through 2.
dial-shelf	Dial shelf chassis in the Cisco AS5800 access server that contains the interface card.
/*t3-port*	T3 port number. The only valid value is 0.
:*t1-num*	T1 timeslot in the T3 line. The value can be from 1 to 28.

Defaults

No T1, E1, or J1 controller is configured.

Command Modes

Global configuration

Command History

Release	Modification
10.0	This command was introduced.
10.3	The **e1** keyword was added.
12.0(3)T	Support was added for dial shelves on Cisco AS5800 access servers.
12.2(7)XO	The **j1** keyword was added for the Cisco 2600 and Cisco 3600 series.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.4(11)XW	The *subslot* argument was added for the Cisco 2800 and Cisco 3800 series.

Usage Guidelines

T1 or E1 Fractional Data Lines

This command is used in configurations where the router or access server is intended to communicate with a T1 or E1 fractional data line. Additional parameters for the T1 or E1 line must be configured for the controller before the T1 or E1 circuits can be configured by means of the **interface** global configuration command.

To view the status of the controllers use the **show controllers** command.

Examples

Cisco 7500 Series Router As a T1 Controller

The following example configures the MIP in slot 4, port 0 of a Cisco 7500 series router as a T1 controller:

```
Router(config)# controller t1 4/0
Router(config-controller)#
```

Cisco AS5800 Access Server with Dial Shelf

The following example configures the T1 controller in shelf 1, slot 0, port 0:

```
Router(config)# controller t1 1/0/0:1
Router(config-controller)#
```

Cisco 3660 As a J1 Controller

The following example configures the Cisco IOS interface card in slot 3, port 0 of a Cisco 3660 as a J1 controller:

```
Router(config)# controller j1 3/0
Router(config-controller)#
```

Related Commands

Command	Description
bert abort	Resets the T1 or E1 controller.
interface serial	Specifies a serial interface created on a channelized E1 or channelized T1 controller (for ISDN PRI, CAS, or robbed-bit signaling).
show controllers content-engine	Displays information about the E1 links supported by the NPM (Cisco 4000) or MIP (Cisco 7500 series).
show controllers j1	Displays information about the J1 link.
show controllers t1	Displays the total number of calls and call durations on a T1 controller.

Feature Information for T1/E1 HWICs and Network Modules

Table 3 lists the release history for this feature.

Not all commands may be available in your Cisco IOS software release. For release information about a specific command, see the command reference documentation.

Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which Cisco IOS and Catalyst OS software images support a specific software release, feature set, or platform. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

Note Table 3 lists only the Cisco IOS software release that introduced support for a given feature in a given Cisco IOS software release train. Unless noted otherwise, subsequent releases of that Cisco IOS software release train also support that feature.

Table 3 Feature Information for T1/E1 HWICs and Network Module

Feature Name	Releases	Feature Information
T1/E1 HWICs and 8-Port T1/E1 Network Module	12.4(11)XW5 12.4(20)T	T1/E1 HWICs are available as follows: • Channelized 1-port T1/E1 HWIC • Channelized 2-port T1/E1 HWIC • Clear channel 4-port T1/E1 HWIC The T1/E1 network module is available as an 8-port channelized T1/E1 network module. T1/E1 HWICs are supported on Cisco 2811, 2821, and 2851 routers, and on Cisco 3800 series routers. The T1/E1 network module is supported on Cisco 3800 series routers.